

WHAT IS CLAIMED IS:

1. A semiconductor device, comprising:  
an auxiliary mark used to detect aberration of a lens used for an exposure step of a semiconductor device so as to modify said lens unit to reduce said lens aberration,  
5 said auxiliary mark including  
an inner mark forming four sides of a first virtual rectangle on a semiconductor substrate when viewed two-dimensionally, and  
an outer mark forming four sides of a second virtual rectangle analogous to the first virtual rectangle and having the same intersection point of diagonals as the first virtual rectangle when viewed two-dimensionally,  
10 said inner mark and said outer mark being formed to have stepped portions, which stepped portions belong to one same layer and can be detected by a registration accuracy measurement device.
2. A semiconductor device according to claim 1, wherein said outer mark having said stepped portions is formed as a box pattern, a line pattern, or a hole pattern.
3. A semiconductor device according to claim 1, wherein said inner mark having said stepped portions is formed as a box pattern, a line pattern, or a hole pattern.
4. A semiconductor device according to claim 1, wherein said outer mark having said stepped portions is formed either as a positive pattern or a negative pattern.
5. A semiconductor device according to claim 1, wherein said inner mark having said stepped portions is formed either as a positive pattern or a negative pattern.

6. A semiconductor device according to claim 1, wherein said auxiliary mark includes a plurality of said auxiliary marks dispersed across an entire exposure region on said semiconductor substrate.

7. A semiconductor device according to claim 1, wherein said inner mark includes a plurality of said inner marks having said stepped portions and formed as patterns having different sizes.

8. A semiconductor device according to claim 1, wherein said outer mark includes a plurality of said outer marks having said stepped portions and formed as patterns having different sizes.

9. A semiconductor device according to claim 1, wherein a plurality of said inner marks having said stepped portions are formed to include a box pattern, a line pattern, and a hole pattern.

10. A semiconductor device according to claim 1, wherein a plurality of said outer marks having said stepped portions are formed to include a box pattern, a line pattern, and a hole pattern.

11. A photo-mask used for manufacturing a semiconductor device, comprising:

an opening corresponding to a pattern of an auxiliary mark, said auxiliary mark including

5 an inner mark forming four sides of a first virtual rectangle when viewed two-dimensionally, and

an outer mark forming four sides of a second virtual rectangle analogous to the first virtual rectangle and having the same intersection point of diagonals as the first virtual rectangle when viewed two-dimensionally,

10 said inner mark and said outer mark being formed to have steps, which stepped portions belong to one same layer and can be detected by a registration accuracy measurement device.

12. A method of enhancing registration accuracy of a semiconductor device using an auxiliary mark, said auxiliary mark including

- 5        an inner mark forming four sides of a first virtual rectangle on a semiconductor substrate when viewed two-dimensionally, and
- an outer mark forming four sides of a second virtual rectangle analogous to said first virtual rectangle and having the same intersecting point of diagonals as said first virtual rectangle when viewed two-dimensionally,
- 10      said inner mark and said outer mark being formed to have stepped portions, which stepped portions belong to one same layer and can be detected by a registration accuracy measurement device.